

treatment is by no means superficial, and is in many places highly condensed. It is all done in forty-two pages, a remarkable testimony to the compactness of quaternion notation and the brevity of quaternion proofs. In chapter xvii., on projective geometry, Prof. Joly gives his own interesting extension, in which a new interpretation is assigned to the quaternion, and he concludes in chapter xviii. with quaternions generalised so as to be applicable to space of any number of dimensions.

There can be no question as to the high merits of the "Manual of Quaternions." It is a worthy companion volume to the master's own great works. Like the "Elements" of Hamilton and the "Elementary Treatise" of Tait, it is characterised by the extraordinary range of mathematical subjects which come within its scope. It is not merely the substitution of one symbol for three or one for four which makes this condensation possible, for that, after all, is a question simply of notation. But the quaternion calculus rejoices in the possession of two remarkable operators, the linear vector function ϕ and the vector differentiator ∇ . They operate singly and in combination according to laws which naturally evolve themselves from the fundamental laws of the calculus. They can be linked together in an endless variety of ways, and go far to give to Hamilton's quaternions a flexibility, power, and pictorial compactness not possessed by any other general method which is directly applicable to problems of mathematics pure and applied. These features are exquisitely brought out in Prof. Joly's "Manual."

C. G. K.

SOME MEDICAL WORKS.

- (1) *New Methods of Treatment.* By Dr. Laumonier. Translated from the second revised and enlarged French edition, and edited by Dr. H. W. Syers. Pp. xvii + 321. (London: Constable and Co., Ltd., 1904.) Price 7s. 6d. net.
- (2) *The Surgery of the Diseases of the Appendix Vermiformis and their Complications.* By W. H. Battle and E. M. Corner. Pp. xi + 208. (London: Constable and Co., Ltd., 1904.) Price 7s. 6d. net.
- (3) *Clinical and Pathological Observations on Acute Abdominal Diseases.* (The Erasmus Wilson Lectures, 1904.) By E. M. Corner. Pp. 98. (London: Constable and Co., Ltd., 1904.) Price 3s. 6d. net.
- (4) *A Short Treatise on Anti-Typhoid Inoculation.* By Dr. A. E. Wright. Pp. x + 76. (London: Constable and Co., Ltd., 1904.) Price 3s. 6d. net.
- (5) *The Suppression of Tuberculosis.* By Prof. E. von Behring. Authorised translation by Dr. Charles Bolduan. Pp. v + 85. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1904.) Price 4s. 6d. net.

(1) **E**VERY year a multitude of substances, chiefly synthetic, is introduced, every one being extolled as a certain cure for this or that ailment. By good fortune one of them is now and then found to be of real value, and for a time at least finds a place in the "aramentaria medica," but the majority in a year or two pass into oblivion. Similarly new

modes of treatment come and go, most of them being of little worth. But the medical practitioner is expected to know of all these medicinal substances and vagaries of treatment, and must be prepared to employ any one of them at the suggestion of some faddist who happens to consult him. From this point of view the first book on our list may be a useful guide, but otherwise one would be inclined to ask, *cui bono?* Some of the substances included in the volume are by no means new, e.g. thyroid, guaiacol, and the anti-toxic sera, while others which have a greater claim to novelty, and are, moreover, of real value, such as aspirin, acetozone, urotropine and cystamine, and purgen, are omitted. In dealing with tetanus antitoxin, no mention is made of injection into the spinal cord or nerve trunks. As regards phosphorised principles, lecithin, glycerophosphates, &c., which have of late been extolled in wasting diseases and nervous affections, the administration of a couple of eggs a day would probably be of far greater benefit than any of the medicinal preparations of these substances.

(2) Messrs. Battle and Corner give a succinct account of the anatomy, pathology, symptoms, and treatment of that common and fashionable malady appendicitis which may be safely recommended as a guide for the medical practitioner. The origin and function of the vermiciform appendix are discussed, that little blind tubular appendage of the bowel inflammation of which gives rise to so much trouble. The appendix has usually been regarded as a vestigial structure and useless in function, but the researches of Mr. R. Y. A. Berry, of Edinburgh, suggest that it is a specialised mass of lymphoid tissue which the authors conceive may serve as a defensive mechanism against bacterial invasion in a portion of the bowel where, for anatomical and other reasons, there is a delay in the passage of the intestinal contents onwards, and special protection is therefore required against the absorption of bacterial products.

(3) This work is based on material collected in compilation of the Erasmus Wilson lectures, 1904. The author states that the main object of his lectures was to direct attention to the identity of the pathological changes concerned in the production of all acute perforative and gangrenous processes of the alimentary tract. He suggests that two extremes of tissue death or necrosis may be recognised, viz. that due to deprivation of blood and that caused by the action of micro-organisms. Between these two there are various grades and admixtures; the former is slow in action, the latter very rapid, and it is this which plays so important a part in abdominal necrosis. The work is practically a collection of notes, but is interesting reading.

(4) Prof. Wright has done well to collect into a single volume the various papers, with amplifications, he has from time to time contributed to various journals on the subject of anti-typhoid vaccination. The method of preparation of the vaccine, theoretical and practical considerations as to its use, and statistics of its value are all considered. With regard to the last named, it must be mentioned that some controversy has taken place in the medical Press as to

the validity of Prof. Wright's conclusions from the statistical evidence.

(5) This little book should be in the hands of every hygienist, and, since it deals largely with bovine tuberculosis, of every scientific stock owner. Behring is one of those who not only disbelieves the dictum of Koch of the essential distinction between human and bovine tuberculosis, but goes to the other extreme, and asserts that "the milk fed to infants is the chief cause of consumption," and he would insist on the pasteurisation of all milk. He asserts that pulmonary tuberculosis (phthisis or consumption of the lungs) is not an infection from inhaled tubercle bacilli. Besides pasteurisation, Behring also recommends the use of formalin as a preservative of milk, a procedure which will probably not commend itself to the authorities here, though there is a good deal to be said in its favour. Finally, he describes a method of vaccinating cattle against the tubercle bacillus by the aid of which he hopes eventually to stamp out bovine tuberculosis, and as a consequence human tuberculosis, a consummation devoutly to be hoped for.

R. T. H.

THE PIONEERS OF GEOLOGICAL THOUGHT.

Karl Ernst Adolf von Hoff, der Bahnbrecher moderner Geologie. By Dr. Otto Reich. Pp. xvi + 144. (Leipzig: Veit and Co., 1905.) Price 4 marks.

THIS clearly written work, undertaken with a just enthusiasm, is a welcome and permanent contribution to the biography of scientific men. Von Hoff's position as an original thinker is at least equal to that of Lyell, though both writers, of course, found notable *Bahnbrecher* before them, in Hutton, Desmarest, and others. Karl von Zittel, in his "Geschichte der Geologie," held the balance very wisely between von Hoff and Lyell when he wrote, "The third volume (of von Hoff's "Geschichte der . . . natürlichen Veränderungen der Erdoberfläche") is clearly influenced by Charles Lyell's first volume of the 'Principles of Geology,' which had appeared in the meantime. Von Hoff unreservedly adopts the point of view of the great British investigator; yet Lyell's views corresponded on the whole with what von Hoff had put forward ten years before as the result of his historical researches. The fact that von Hoff's meritorious work was not properly valued, and was put in the shade by Lyell's epoch-making book, which appeared almost simultaneously, is easily explained by the circumstance that the modest German man of science derived his material mainly from books, that his position did not allow him to examine in the field the questions which he discussed, and that he enriched science by no new facts; he faced his problem as a historian, and not as an observer."

Let us frankly admit, on the British side, that Lyell was not among the great original observers, and that his eminence rests on his brilliant perception of the meaning of correlated facts; yet his energy of movement and his frequent travels gave him an immense advantage over his contemporary. Dr. Reich shows us how von Hoff was occupied in many other affairs while preparing himself for his "Geschichte,"

a work of immense originality, and free indeed from the prejudices of his day.

In 1788 von Hoff entered the University of Jena, in his native region of Thuringia, and proceeded after two years to Göttingen. Here he found inspiration in the character and friendly help of Blumenbach; but his professional work lay in diplomacy, and in 1791 he was appointed Secretary of Legation under his own Government of Gotha, where his father was already a Privy Councillor. As in France, the scientific renaissance was accompanied by national movements that might well have extinguished private calm and study. Von Hoff was one of the delegates who, in 1806, pursued Napoleon's court from Berlin to Posen, and who secured the entry of Gotha into the saving grace of the Confederation of the Rhine. True to the interests of his State, he bore greetings to Jerome of Westphalia two years later, and helped to steer Gotha again into safe waters, this time under a German ægis, when Leipzig had seen the downfall of his alien suzerain. Yet, amid all the excitement of the times, when princes scampered rabbit-like from hole to hole, von Hoff founded a geological journal in 1801, met Werner in Gotha, and was struck by his mental limitations, spoke and corresponded heartily with Goethe, and explored the Thuringian Forest in a number of geological excursions. In the sanguinary year of 1806 he encountered Humboldt in Berlin, and the diplomat of Gotha was describing his native woodlands when the echoes of Friedland spread dismay through Germany.

In 1822 the first volume of his famous "Geschichte der durch Überlieferung nachgewiesenen natürlichen Veränderungen der Erdoberfläche" appeared from the house of Justus Perthes in Gotha; and Dr. Reich does well to press the claims of this work as the foremost and most rational attempt to free geologists from their popular catastrophic school. Dr. Reich (p. 107) quotes from Blumenbach to show that Hutton's views had spread to Germany in 1790, and that Voigt of Jena had already prepared the way by prior and independent conceptions of his own. Von Hoff surpassed Hutton in urging the power of existing causes working through long periods of time. This position had been reached by him as early as 1801 (p. 111), and his biographer is inclined on this account to accuse Lyell of overshadowing wilfully his predecessor. It is idle, however, to quote from the edition of the "Principles of Geology" issued in 1872 (p. 131), in which numerous alterations and additions had led to much excision. Instead of the solitary quotation from von Hoff referred to by Dr. Reich in support of his contention, we find five references in the first edition of vol. i. (1830), and two more in the second edition of vol. ii. (1833). Five references, moreover, to von Hoff remain in the eighth edition of the "Principles," issued in one volume in 1850. Since Lyell in his first edition devoted nine pages to the views of Hutton, out of the seventy given to the history of geology, he can hardly be said, as Dr. Reich would have us believe, to have shown ingratitude to Hutton also.

In 1826, in a memorial notice of Blumenbach, von